

# Cytogenetics and karyosystematics of South American oryzomyine rodents (Cricetidae, Sigmodontinae)

## III. Banding karyotypes of Argentinian *Oligoryzomys*

By MARIA BEATRIZ ESPINOSA and O. A. REIG

*Centro de investigaciones en Reproducción, Facultad de Medicina, Universidad de Buenos Aires, and GIBE, Departamento de Ciencias Biológicas, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina*

Receipt of Ms. 4. 5. 1990  
Acceptance of Ms. 24. 6. 1991

### Abstract

Studied the karyotypes of 86 specimens of *Oligoryzomys* cricetid mice from 15 different localities of Argentina. Four different chromosomal complements were found in the different samples. A polymorphic karyotype of  $2n = 66-67-68$  (FN = 68–69–70) assigned to *O. flavescens* showed large amounts of positive C-banding, two types of Y chromosomes and the presence of supernumerary elements in samples from the Buenos Aires province, Maimará (Jujuy) and El Infiernillo (Tucumán), enabling to assess the wide distribution and ecological versatility of this species. A karyotype of  $2n = 58$  (FN = 74) similar to a variant of *O. longicaudatus* described by GARDNER and PATTON from Perú, was found in samples from León (Jujuy) and from several lowland populations of Tucumán. They are provisionally considered to belong to *O. stolzmanni*. A karyotype of  $2n = 56$  (FN = 64, 66) similar to previously described karyotypes of *O. longicaudatus*, was found in samples from Tierra del Fuego and San Carlos de Bariloche. The cytotype variant of Tierra del Fuego proved to be identical to that of *O. longicaudatus philippi*, suggesting a lack of agreement between chromosomal differentiation and current subspecies recognition. A topotypical sample of *O. delticola* confirmed a karyotype of  $2n = 62$  (FN = 82) for this species.

### Introduction

Rice rats currently assigned to the subgenus *Oligoryzomys* (genus *Oryzomys*) are widely distributed in Neotropica, and where they appear, they constitute an important component of its small mammal communities.

Notwithstanding its commonness and ecological importance, this taxon is certainly in an appalling state of confusion. Numbers of species comprised in *Oligoryzomys* vary, according to different authors, from just one (HERSHKOVITZ 1966a; but see also HERSHKOVITZ 1966b) to 31 (TATE 1932). Of the 31 species recognized by TATE, 12 are distributed from the south of Perú to Tierra del Fuego. Six of them are currently recognized in Argentina: *O. chacoensis*, *O. delticola*, *O. flavescens*, *O. fornesi*, *O. longicaudatus*, and *O. nigripes* (HONACKI et al. 1982). Recently, partial revisions of related Paraguayan (MYERS and CARLETON 1981) and Bolivian (OLDS and ANDERSON 1987) forms have contributed to clarification of their status. However, many problems still remain unsolved with regard to their taxonomy and nomenclature.

The aim of this paper is to contribute to a better knowledge of the Argentinian *Oligoryzomys* by the cytogenetic study of several samples belonging to four different species.

### Material and methods

Cytogenetic analysis was performed on 86 mice of 15 different localities. They were collected with Sherman live traps and processed in the laboratory. Skin and skulls were deposited in the collection of

mammals of the Museo Municipal de Ciencias Naturales "Lorenzo Scaglia" of Mar del Plata, Argentina. Species and localities given in Table 1.

Bone marrow chromosomal spreads were obtained following the current techniques, and stained with Giemsa. G- and C-bands were obtained following SEABRIGHT (1971) and SUMNER (1972), respectively. Chromosome lengths were expressed as percentage of the female haploid set (FHS), calculated from a minimum of 10 metaphases. Chromosome size classes followed REIG and KIBLISKY (1969): large (> 9 FHS), medium-sized (9–5.5 FHS), small 5.5–2 FHS), and microchromosomes (< 2 FHS). Chromosome nomenclature according to centromere position followed LEVAN et al. (1964). NF numbers are autosomal arm numbers.

Table 1. Locality data for specimens of *Oligoryzomys* used in this study

Species	Locality	Geographic coordinates	Chromosomically studied	
			Males	Females
<i>O. flavescens</i>	Paraná River Delta (Buenos Aires)	34° 10' S; 71° 18' W	7	4
	Monte Hermoso (Buenos Aires)	39° 02' S; 61° 12' W	5	2
	Capilla del Señor (Buenos Aires)	34° 16' S; 59° 06' W	2	1
	Diego Gaynor (Buenos Aires)	34° 18' S; 59° 09' W	5	1
	Río Cuarto (Córdoba)	33° 06' S; 64° 22' W	1	1
<i>O. cf. flavescens</i>	Maimará (Jujuy)	23° 35' S; 65° 24' W	1	4
	El Infiernillo (Tucumán)	26° 40' S; 65° 46' W	–	1
<i>O. longicaudatus</i>	S. C. de Bariloche (Río Negro)	41° 11' S; 71° 18' W	2	–
	Bahía La Pataia (Tierra del Fuego)	54° 50' S; 68° 26' W	1	1
<i>O. cf. longicaudatus</i>	León (Jujuy)	24° 03' S; 65° 26' W	7	5
	Horco Molle y Quebrada de los Sosa (Tucumán)	26° 49' S; 65° 15' W	19	7
	El Cadillal (Tucumán)	26° 40' S; 65° 16' W	2	1
	Burrucacú (Tucumán)	26° 29' S; 64° 45' W	1	–
<i>O. delticola</i>	Delta del Río Parana (Buenos Aires)	34° 10' S; 59° 14' W	4	1

## Results

*Oligoryzomys flavescens*. Most of the specimens analysed showed a karyotype of  $2n = 66$  (FN = 68) (Fig. 1) comprised of 32 pairs of autosomes and the XY sexual set. The first autosomal pair is a large (9.0 FHS) pair of chromosomes and clearly distinguishable from the second pair by a sharp size gap. The following series of 31 autosomal pairs are telocentric or acrocentric autosomes in which short arms are often difficult to distinguish, with the exception of two pairs of small and minute chromosomes in which a biarmed condition is evident in most cells (Table 2). This karyotype was the mode in 25 out of 29 studied specimens. Two males from Diego Gaynor, one female from Capilla del Señor,

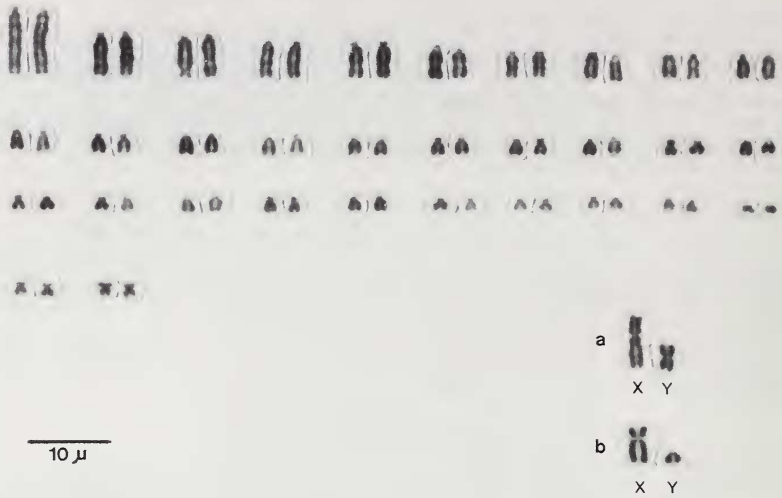


Fig. 1. Giemsa stained karyotype of *O. flavescens* from Diego Gaynor, Buenos Aires province. a and b: sexual set showing two types of Y-chromosome

and one female from Paraná River delta showed a  $2n = 67$  karyotype, with one small extra element (Fig. 2b). The sexual set was composed by a medium-sized submetacentric X (6.28 FHS) and two types of Y, telocentric and metacentric (Fig. 1) in both  $2n = 66$  and 67 karyomorphs. Each population was characterized by one of these Y-morphologies, except in Diego Gaynor and Paraná River delta samples, which proved to be polymorphic for the Y.

G- and C-banding are shown in Figure 2. C-banding showed that a sizable portion of the genome is C-positive. All autosomes showed pericentromeric C-bands and full C-positive short arms are also inferred in some of the autosomes. The extra element found in the  $2n = 67$  karyotype was fully C-positive, as well as the small arm and the pericentric region of the long arm of the X chromosome. While telocentric Y chromosomes were found to be C-positive, in the metacentric Ys only a terminal C-band in the small arm was found.

*Oligoryzomys cf. flavescens*. A karyotype similar to that described above, both in chromosomal number, gross morphology and banding patterns was found in female specimens from Maimará, Jujuy Province and from El Infiernillo, Tucumán Province. In the five specimens from Maimará diploid numbers ranged from  $2n = 66$  (FN = 68) to  $2n = 68$  (FN = 70), and the X was a medium-sized (6.4 FHS) submetacentric chromosome (Table 2). The single available female from El Infiernillo had a  $2n = 68$  (FN = 70) karyotype identical to the variant found in Maimará.

*Oligoryzomys cf. longicaudatus*. The specimens from León (Jujuy) and from Tucumán localities other than El Infiernillo, showed an asymmetric  $2n = 58$  (FN = 74) karyotype (Fig. 3a). The autosomal set comprised 19 pairs of telocentric or acrocentric chromosomes and 9 pairs of biarmed elements. In the acrocentric series, the first pair was very close to the large class (8.8 FHS), bearing very small arms. It is clearly distinguishable by size from the following autosomes which gradually decrease in size from small to microchromosomes. Two elements of the biarmed series are large metacentrics, separated by an abrupt size gap from the seven following pairs, which are small to minute in size.

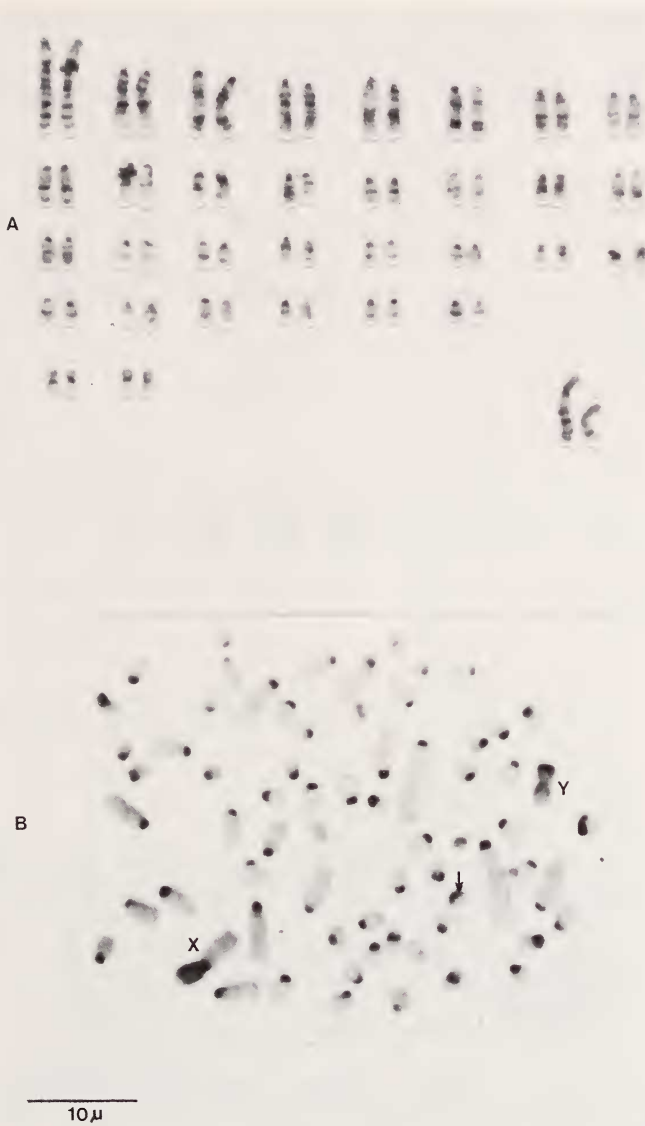


Fig. 2. A: G-banded karyotypes of *O. flavescens*. B: C-banded chromosomes of *O. flavescens* male  $2n = 67$  from Diego Gaynor, Buenos Aires province (arrow indicates the small extra element)

The X was a medium-sized submetacentric (7.6 FHS), and the Y a small-sized telocentric (2.6 FHS) (Table 3).

G-banding is shown in Figure 5. A preliminary arm-to-arm comparison showed that autosomes of the first acrocentric pair are homologous with the first pair of *O. flavescens*.

*Oligoryzomys longicaudatus*: A  $2n = 56$  (FN = 66) karyotype was found in specimens from Tierra del Fuego, with the autosomal set made of 21 telocentric or acrocentric pairs decreasing in size and 6 banded small-sized pairs (Figs. 3b, 6; Table 3). The first pair of acrocentrics corresponds very closely to the large class (8.8 FHS) and is separated from the

Table 2. Chromosomal lengths of *Oligoryzomys flavescens* and *Oligoryzomys cf. flavescens* expressed as percentage of the female haploid set

Chromosome	<i>O. flavescens</i> $\bar{X} \pm SD$	<i>O. cf. flavescens</i> $\bar{X} \pm SD$
1	9.0 ± 0.9	8.3 ± 0.6
2	6.1 ± 0.5	5.8 ± 0.3
3	5.6 ± 0.5	5.3 ± 0.2
4	5.0 ± 0.3	5.1 ± 0.2
5	4.7 ± 0.3	4.8 ± 0.1
6	4.3 ± 0.2	4.4 ± 0.2
7	3.8 ± 0.1	3.9 ± 0.1
8	3.5 ± 0.2	3.6 ± 0.2
9	3.4 ± 0.1	3.4 ± 0.2
10	3.2 ± 0.2	3.4 ± 0.2
11	2.9 ± 0.2	2.9 ± 0.1
12	2.7 ± 0.2	2.7 ± 0.2
13	2.5 ± 0.1	2.6 ± 0.2
14	2.5 ± 0.1	2.6 ± 0.2
15	2.4 ± 0.2	2.4 ± 0.1
16	2.3 ± 0.2	2.4 ± 0.1
17	2.3 ± 0.2	2.3 ± 0.1
18	2.1 ± 0.3	2.2 ± 0.1
19	2.0 ± 0.2	2.1 ± 0.2
20	2.0 ± 0.2	2.1 ± 0.2
21	1.9 ± 0.2	2.0 ± 0.2
22	1.9 ± 0.2	2.0 ± 0.2
23	1.8 ± 0.2	1.9 ± 0.1
24	1.7 ± 0.2	1.9 ± 0.1
25	1.7 ± 0.2	1.8 ± 0.1
26	1.6 ± 0.2	1.7 ± 0.2
27	1.5 ± 0.2	1.6 ± 0.1
28	1.5 ± 0.2	1.5 ± 0.1
29	1.4 ± 0.2	1.3 ± 0.1
30	1.3 ± 0.2	1.2 ± 0.2
31	2.2 ± 0.2 (1.4 ± 0.3) <sup>a</sup>	2.5 ± 0.3 (1.2 ± 0.1)
32	1.9 ± 0.3 (1.1 ± 0.2)	2.1 ± 0.3 (1.1 ± 0.2)
X	6.8 ± 0.6 (2.4 ± 0.4)	6.4 ± 0.9 (2.5 ± 0.9)
Y	3.8 ± 0.8 (1.4 ± 0.3)	3.5 ± 0.7 (1.5 ± 0.2)
Y <sup>b</sup>	2.6 ± 0.3	

<sup>a</sup> Number in parentheses indicates the centromeric index (long arm/small arm) of biarmed chromosomes. - <sup>b</sup> Telocentric Y.

following by a sharp size gap. The sexual set showed a medium-sized (6.5 FHS) subtelocentric X chromosome and a small (4.6 FHS) submetacentric Y. Specimens from Bariloche showed a similar  $2n = 56$  karyotype with fewer numbers of arms (FN = 64), and a submetacentric, instead of subtelocentric X chromosome. This suggests that both karyomorphs are interrelated by means of an autosomal pericentric inversion.

*Oligoryzomys delticola*: Topotypes from the Paraná River delta showed a rather symmetrical  $2n = 62$  karyotype (FN = 82) made of 19 pairs of gradually decreasing small-sized and micro-acrocentric autosomes in which no short arms have been observed; and 11 biarmed autosomal pairs, ranging from medium sized to microchromosomes, including subtelocentric, submetacentric and metacentric autosomes (Fig. 4). The X was a medium-sized (6.2 FHS) metacentric chromosome and the Y a small (2.9 FHS) submetacentric chromosome (Table 3). G-banding is shown in Figure 7.

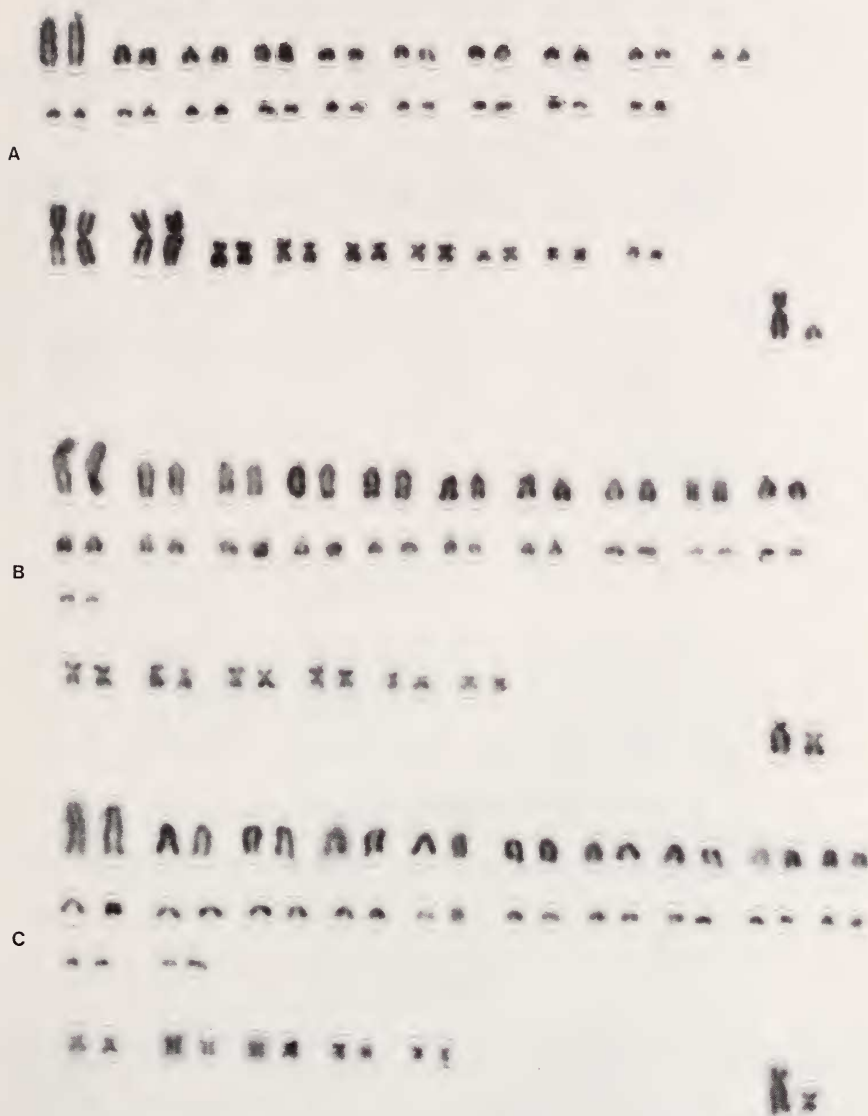


Fig. 3. Giemsa-stained karyotypes of: A: *Oligoryzomys* cf. *longicaudatus* from Horco Molle, Tucumán province ( $2n = 58$ , FN = 74). B: *O. longicaudatus* from Bahía La Pataia, Tierra del Fuego ( $2n = 56$ , FN = 66). C: *O. longicaudatus* from Bariloche, Rio Negro province ( $2n = 56$ , FN = 64)

Table 3. Chromosomal lengths of *Oligoryzomys cf. longicaudatus*, *Oligoryzomys longicaudatus* and *Oligoryzomys delticola* expressed as percentage of the female haploid set

Chromosome	<i>O. cf. longicaudatus</i> X ± SD	<i>O. longicaudatus</i> X ± SD	<i>O. delticola</i> X ± SD
1	8.8 ± 1.7	8.8 ± 0.3	4.9 ± 0.3
2	4.1 ± 0.2	5.9 ± 0.2	4.4 ± 0.2
3	3.6 ± 0.2	5.5 ± 0.3	3.8 ± 0.1
4	3.4 ± 0.2	5.3 ± 0.3	3.5 ± 0.2
5	3.1 ± 0.3	4.9 ± 0.2	3.2 ± 0.2
6	2.8 ± 0.2	4.3 ± 0.3	3.0 ± 0.1
7	2.6 ± 0.1	4.0 ± 0.2	2.8 ± 0.1
8	2.4 ± 0.2	3.8 ± 0.2	2.7 ± 0.1
9	2.2 ± 0.2	3.5 ± 0.2	2.6 ± 0.2
10	2.1 ± 0.1	3.3 ± 0.1	2.4 ± 0.1
11	2.0 ± 0.2	3.1 ± 0.1	2.4 ± 0.1
12	1.8 ± 0.1	2.8 ± 0.2	2.2 ± 0.1
13	1.8 ± 0.1	2.7 ± 0.1	2.1 ± 0.1
14	1.7 ± 0.1	2.5 ± 0.1	2.0 ± 0.1
15	1.7 ± 0.1	2.4 ± 0.1	2.0 ± 0.1
16	1.6 ± 0.1	2.2 ± 0.2	1.8 ± 0.1
17	1.6 ± 0.1	2.1 ± 0.2	1.7 ± 0.1
18	1.5 ± 0.2	2.0 ± 0.2	1.6 ± 0.2
19	1.3 ± 0.1	1.8 ± 0.1	1.3 ± 0.2
20	11.4 ± 0.8 (1.2 ± 0.1) <sup>a</sup>	1.6 ± 0.1	7.9 ± 0.4 (4.0 ± 0.5)
21	10.4 ± 0.8 (1.3 ± 0.1)	1.4 ± 0.1	6.2 ± 0.3 (5.0 ± 0.7)
22	4.5 ± 0.4 (1.1 ± 0.1)	4.1 ± 0.2 (1.2 ± 0.1)	6.0 ± 0.3 (2.0 ± 0.2)
23	3.6 ± 0.3 (1.4 ± 0.3)	3.8 ± 0.3 (1.2 ± 0.1)	3.9 ± 0.2 (1.8 ± 0.2)
24	3.4 ± 0.2 (1.3 ± 0.2)	3.6 ± 0.1 (1.3 ± 0.4)	3.7 ± 0.3 (1.4 ± 0.2)
25	3.1 ± 0.3 (1.1 ± 0.1)	3.2 ± 0.2 (1.1 ± 0.1)	3.5 ± 0.2 (1.1 ± 0.1)
26	2.5 ± 0.4 (1.2 ± 0.1)	2.8 ± 0.3 (1.3 ± 0.3)	3.3 ± 0.2 (1.2 ± 0.2)
27	2.0 ± 0.3 (1.2 ± 0.2)	2.4 ± 0.2 (1.3 ± 0.3)	3.0 ± 0.2 (1.1 ± 0.1)
28	1.7 ± 0.2 (1.0 ± 0.1)		2.3 ± 0.2 (1.3 ± 0.3)
29			2.1 ± 0.1 (1.1 ± 0.1)
30			1.7 ± 0.2 (1.0 ± 0.1)
X	7.6 ± 0.7 (2.4 ± 0.5)	6.5 ± 0.6 (3.3 ± 0.7)	6.2 ± 0.5 (1.3 ± 0.1)
Y	2.6 ± 0.4	4.6 ± 0.5 (1.4 ± 0.2)	2.9 ± 0.4 (2.3 ± 0.6)

<sup>a</sup> Numbers in parentheses indicate the centromeric index (long arm/small arm) of banded chromosomes.

## Discussion

The karyotypes found in specimens of *O. flavescens* from different localities of Buenos Aires Province are quite similar to those described by BRUM et al. (1977, 1988); SBALQUEIRO et al. (1982, 1986) and VIDAL RIOJA et al. (1988) for populations of the same species from Uruguay and southern Brazil. The heteromorphism of the Y chromosome, as well as the presence of supernumerary elements found in those populations and in those studied by us, seem to be a feature of this species. A population study of a larger number of specimens would be necessary to determine the frequency of the two kinds of Y chromosomes, and the frequency and number of B chromosomes. Morphological variations of the sexual chromosomes do not seem to be unusual among oryzomyine rodents, as they have been observed in *O. nigripes*, *O. subflavus* and *O. longicaudatus* (ALMEIDA et al. 1986; SVARTMAN et al. 1986; GALLARDO and GONZALEZ 1977). Studies on sex chromosome variation particularly refer to the X chromosome (for a review, see FREDGA 1988), and Y chromosome heteromorphism was reported in a few cases such as *Clethrionomys* (Arvicolidae) (VORONTZOW and LYAPUNOVA 1978) and *Proechimys* (Caviomorpha) (REIG

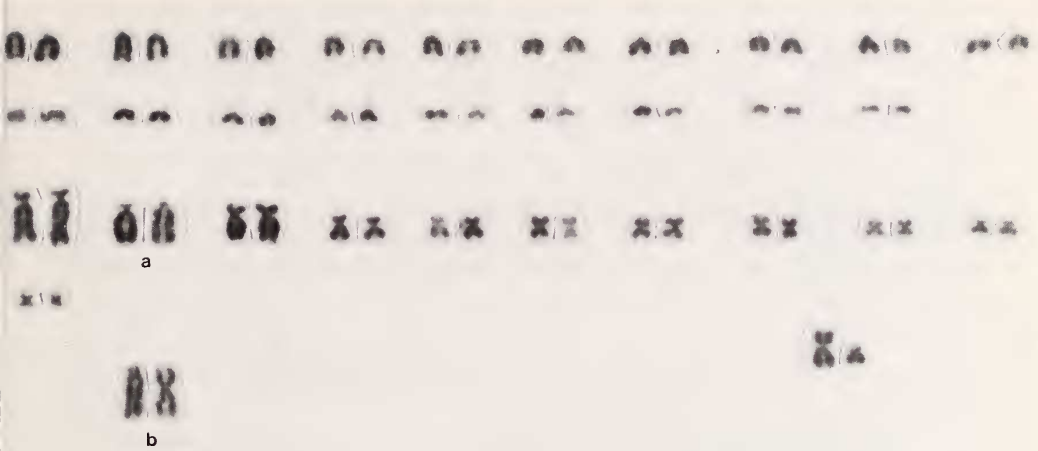


Fig. 4. Giemsa-stained karyotype of *O. delticola* from Paraná Delta River ( $2n = 62$ ,  $FN = 82$ ). a and b: pair 21 heteromorphic with pericentric inversion



Fig. 5. G-banded karyotype of *O. cf. longicaudatus* from León, Jujuy province

et al. 1980). B chromosomes are of rare occurrence in mammals (JONES and REES 1982). In rodents, they have been reported in *Perognathus* (PATTON 1977), *Apodemus peninsulae* (BEKASOVA et al. 1978), *Akodon mollis* (LOBATO et al. 1982), *Nectomys squamipes* (MAIA et al. 1984) and a few other examples. The observations of SBALQUEIRO et al. (1986) indicate that the supernumerary elements vary among different populations of *O. flavescens*.

The karyotypes found in the Maimará and El Infiernillo samples are quite similar to those reported for *O. flavescens* and corroborated by us in different populations of the province of Buenos Aires. This similarity allows to assert that there is no cytologic barriers between these populations.



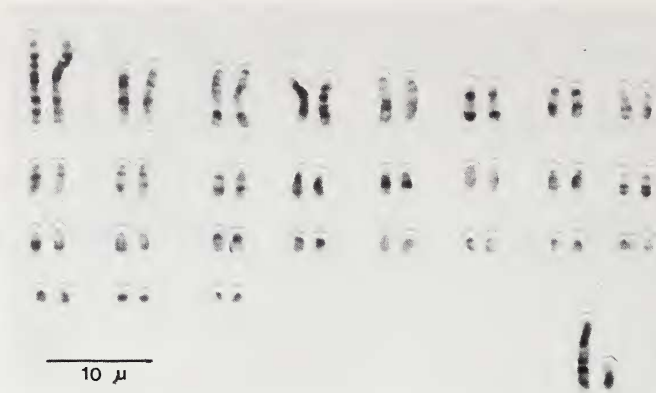


Fig. 6. G-banded karyotype of *O. longicaudatus* from Bariloche, Rio Negro province



Fig. 7. G-banded karyotype of *O. delticola* from Paraná River delta, Buenos Aires province

MYERS and CARLETON (1981) found a great morphological similarity between *O. flavescens* and *O. fornesi*, and they questioned the species distinction of the latter. However, they found some karyological differences between them based on the karyotype of *O. flavescens* previously described by BRUM (1965). However, this karyotype was based on old and unreliable techniques. In fact, the karyotype described by these authors for *O. fornesi* from Paraguay is basically the same, that we found for *O. flavescens* and *O. cf. flavescens* from Argentina, and it also fully agrees with the karyotype of *O. flavescens* from Uruguay recently described by BRUM et al. (1988). Thus, our results support the doubt of MYERS and CARLETON (1981) on the validity of *O. fornesi*. The issue is further complicated by the claim of OLDS and ANDERSON (1987) that *O. fornesi* is a synonym for *O. microtis*, which they consider a different species from *O. flavescens*, so that at the present state of our knowledge it is wiser to think of *O. fornesi* at least as a subspecies of *O. flavescens*.

The karyotype found for *O. longicaudatus*, of Tierra del Fuego, which should be referred to as the subspecies *O. l. magellanicus*, is identical to that described by GALLARDO and GONZÁLEZ (1977) for the subspecies *O. l. philippi* from Valdivia, Chile. It is also

intriguing that OLIVERO (1985) found a karyotype of *O. longicaudatus* from Isla Redonda, Tierra del Fuego (which should be identified as *O. l. magellanicus*, see OSGOOD 1943), which matches the variant that we found in Bariloche (which should be classified as *O. l. longicaudatus*). Thus, the chromosomal data seems to indicate that there is no correspondence between subspecies recognition and karyotypic differentiation in *O. longicaudatus*.

Notwithstanding its gross general resemblance, the karyotype of  $2n = 58$  (FN = 74) found in populations of León (Jujuy province) and Tucumán (other than El Infiernillo) differs significantly from the typical representatives of this species from Chile and Tierra del Fuego (GALLARDO and PATTERSON 1985). These differences are large enough to suggest that we are dealing with a different species. The karyotype more closely related to that of León and the lowland Tucumanian localities is the variant (4) karyotype of *O. longicaudatus* described by GARDNER and PATTON (1976) in specimens from Huanhuacchayo, Dto. Ayacucho, Perú at an altitude of 1,660 m above sealevel. The León and Tucumanian karyotype only differs from the Peruvian one by possessing one pair of telocentric elements. Therefore, it is likely that the Peruvian, Leonian and Tucumanian cytotypes belong to the same species. As regards the name to apply to this species, a definite solution is probably untimely in view of the dubious situation of nominal forms such as *O. stolzmanni*, *O. destructor* and *O. microtis* (see OLDS and ANDERSON 1987). A conventional solution would be to refer to these cytotypes as *O. stolzmanni*, found in Huambo, Dept. of Amazonas, Perú at 1,133 m. The specimens from León are within the same height range and belong to similar habitats.

The karyotypes found in *O. delticola* from the type locality matches perfectly those described in previous reports for South Brazil (SBALQUEIRO et al. 1982, 1986) and Uruguay (BRUM et al. 1988). We also confirmed this karyotype in one female circumstantially caught in Salto, Uruguay, which showed a heteromorphic variant at pair 21 with one of the autosomes affected by a pericentric inversion. No heteromorphism in the topotypical specimens was found, but in view of the small size of the studied sample, we cannot discard its occurrence in that locality.

### Acknowledgements

The authors wish to thank ORLANDO SAGLIA, MARTA PIANTANIDA, RUBÉN BARQUEZ and GLORIA DE VILLAFANE for providing the specimens and help during field work. Thanks also to Dr. J. BLEJER for her help in preparing the German summary, and to A. D. VITULLO for help and suggestions. This work was supported by a CONICET grant given to O. A. REIG.

### Zusammenfassung

Zytogenetik und Karyosystematik von südamerikanischen Reissratten (Cricetidae, Sigmodontinae).

#### III. Banden-Karyotypen von argentinischen *Oligoryzomys*

Untersucht wurden die Karyotypen von 86 Exemplaren der Cricetiden-Gattung *Oligoryzomys* aus 15 Fundorten in Argentinien. Vier verschiedene chromosomale Typen wurden gefunden. Ein polymorpher Karyotyp mit  $2n = 66-67-68$  (FN = 68-69-70), der *O. flavescens* zugeschrieben wurde, zeigte eine große Anzahl von C-Banden, zwei Typen von Y-Chromosomen und Auftreten zusätzlicher Elemente in den Stichproben aus der Provinz Buenos Aires, aus Maimará (Jujuy) und aus El Infiernillo (Tucumán). Durch diese Befunde konnte die weite Verbreitung und die ökologische Vielseitigkeit dieser Art bestätigt werden. Im Sammlungsmaterial von León (Jujuy) und bei mehreren Tieflandpopulationen aus Tucumán ergab sich ein Karyotyp mit  $2n = 58$  (FN = 74), der einer Varianten von *O. longicaudatus* ähnelt, die GARDNER und PATTON in Peru fanden. Er wurde vorläufig *O. stolzmanni* zugeordnet. Für die Individuen von Feuerland und San Carlos de Bariloche wurde ein Karyotyp mit  $2n = 56$  (FN = 64-66) ermittelt, der dem früher beschriebenen von *O. longicaudatus* gleicht. Die Variante des Karyotyps von Feuerland scheint identisch mit der von *O. longicaudatus philippi*. Dieses legt den Schluß nahe, daß zwischen chromosomalen Differenzierungen und der aktuellen Kennzeichnung von Unterarten keine Übereinstimmung besteht. Ein topotypischer Fund von *O. delticola* bestätigte für diese Art einen Karyotyp mit  $2n = 62$  (FN = 82).

## Literature

- ALMEIDA, E.; SVARTMAN, M.; CHU, T. H. (1986): Ocorrência de translocação recíproca e presença de isocromossomo em *Oryzomys nigripes* (Cricetidae, Rodentia). Sociedade Brasileira para o progresso da Ciência, 38º Reunión anual, Curitiba-PR. 38, 7.
- BEKASOVA, T. S.; VORONTSOV, N. N.; KOROVITSINA, K. V.; KORABLEV, V. T. (1978): B-Chromosome and comparative karyology of the mice of the genus *Apodemus*. *Genetica* 52/53.
- BRUM, N. (1965): Investigaciones citogenéticas sobre algunas especies de Cricetinae (Rodentia) del Uruguay. An. II Congreso Latinoamericano de Zoología 2, 315-320.
- BRUM-ZORRILLA, N.; DE FRONZA, T. G.; WAINBERG, R.; VIDAL RIOJA, L.; ZWIRNER, N. (1988): *Oryzomys flavescens* and *O. delicola* chromosomes (Rodentia Cricetidae) from Uruguay and Argentina. *Caryologia* 41, 275-288.
- BRUM-ZORRILLA, N.; KIBLISKY, N.; DE BENTHENCOURT, M. (1977): Karyotypes of Uruguayan *Oryzomys* species. III. Congreso Latinoamericano de Genética. Montevideo 1977, 13.
- FREDGA, K. (1988): Aberrant chromosomal sex-determining mechanisms in mammals, with special reference to species with XY females. *Phil. Trans. R., Soc. Lond. B* 322, 83-95.
- GALLARDO, M.; GONZÁLEZ, L. A. (1977): Sex chromosome polymorphism in *Oryzomys longicaudatus philippi* (Rodentia Cricetidae). *Experientia* 33, 312-314.
- GALLARDO, M. H.; PATTERSON, B. D. (1985): Chromosomal differences between two nominal subspecies of *Oryzomys longicaudatus* Bennett. *Mammal Chrom. News* 25, 49-53.
- GARDNER, A. L.; PATTON, J. L. (1976): Karyotypic variation in oryzomine rodents (Cricetidae) with comments on chromosomal evolution in the neotropical cricetine complex. *Occ. Pap. Mus. Zool. Louisiana State Univ.* 49, 1-48.
- HERSHKOVITZ, P. (1966a): South American swamp and fossorial of rats of the scapteromyine group (Cricetidae, Muridae) with comments on the glans penis in murid taxonomy. *Z. Säugetierkunde* 31, 81-149.
- HERSHKOVITZ, P. (1966b): Mice, land bridges and Latin South American grassland rodents: A comparative study. In: *Ectoparasites of Panamá*. Ed. by R. WENZEL and W. J. TRIPTON. *Field Mus. Nat. Hist. Chicago*. pp. 725-747.
- HONACKI, J. H.; KINMAN, K. E.; KOEPL, J. W. (1982): *Mammal species of the world*. Lawrence, Kansas: Allen Press.
- JONES, R. N.; REES, H. (1982): *B-Chromosomes*. New York, London: Academic Press.
- LEVAN, A.; FREDGA, K.; SANDBERG, A. A. (1964): Nomenclature for centromeric position on chromosomes. *Hereditas* 52, 1-22.
- LOBATO, L.; CANTOS, G.; ARAUJO, B.; BIANCHI, N. O.; MERANI, M. S. (1982): Cytogenetics of the South American Akodont rodents (Cricetidae) X: *Akodon mollis*: a species with XY females and B chromosomes. *Genetica* 57, 199-205.
- MAIA, V.; YONENAGA-YASSUDA, Y.; FREITAS, T. R. O.; KASAHARA, S.; SUÑE-MATTEVI, M.; OLIVEIRA, L. F.; GALINDO, M. A.; SBALQUEIRO, I. J. (1984): Supernumerary chromosomes, Robertsonian rearrangement and variability of the sex chromosomes in *Nectomys squamipes* (Cricetidae, Rodentia). *Genetica* 63, 121-128.
- MYERS, P.; CARLETON, M. D. (1981): The species of *Oryzomys* (*Oligoryzomys*) in Paraguay and the identity of Azara's "Rat sixième ou Rat à Tarse Noir". *Misc. Publ. Mus. Zool. Univ. of Michigan* 161, 1-41.
- OLIVERO, A. O. (1985): Estudios citogenéticos en roedores akodontinos de la región austral. Tesis de doctorado. Fac. de Cs. Nat. y Museo. UNLP.
- OLDS, N.; ANDERSON, S. (1987): Notes on Bolivian mammals. 2. Taxonomy and distribution of rice rats of the subgenus *Oligoryzomys*. In: *Studies in Neotropical Mammalogy*. Ed. by B. D. PATTERSON and R. M. TIMM. *Fieldiana, Zoology* (N. S.) 39, 261-276.
- OSGOOD, W. H. (1943): *Mammals of Chile*. *Field Mus. Nat. Hist. Publ. Zool. Ser.* 30, 1-268.
- PATTON, J. L. (1977): B chromosome systems in the pocket mouse, *Perognathus baileyi*: meiosis and C-band studies. *Chromosoma* 60, 1-14.
- REIG, O. A.; AGUILERA, M.; BARROS, M. A.; USECHE, M. (1980): Chromosomal speciation in a Rassenkreis of Venezuelan spiny rats (genus *Proechimys*, Rodentia, Echimyidae). *Genetica* 52/53, 291-312.
- REIG, O. A.; KIBLISKY, P. (1969): Chromosome multiformity in the genus *Ctenomys* (Rodentia, Octodontidae). *Chromosoma* 28, 211-244.
- SBALQUEIRO, J. I.; KIKU, M.; LACEDA, N.; EL ACHKAR, D.; ARNT L. R. (1986): Estudos cromossômicos em roedores da família cricetidae coletados no Paraná. *Soc. Brasil. Progr. Cienc.* 38º Reunión Anual. *Ciencia & Cultura* 38, 926.
- SBALQUEIRO, J. I.; MATTEVI, M. S.; OLIVEIRA, L. F. B.; FREITAS, T. R. O. (1982): Análises cariotípicas de duas espécies do género *Oryzomys* (Rodentia) coletadas no extremo sul do Brasil. *Soc. Brasil. Progr. Cienc.* 34º Reunión Anual. *Ciencia & Cultura* 34, 749.
- SEABRIGHT, M. (1971): A rapid banding technique for human chromosomes. *Lancet* 2, 971-972.

- SUMNER, A. T. (1972): A simple technique for demonstrating centromeric heterochromatin. *Exp. Cell. Res.* **75**, 304–306.
- SVARTMAN, M.; CARDOSO DE ALMEIDA, E. J.; CHU, T. H. (1986): Novos dados sobre a variabilidade cromosomica en *Oryzomys subflavus* (Cricetidae, Rodentia). *Soc. Brasil. Progr. Cienc.* 38º Reuniao Anual. *Ciencia & Cultura* **38**, 846.
- TATE, G. H. H. (1932): The taxonomic history of the South and Central American cricetid rodents of the genus *Oryzomys*. Part 2: subgenera *Oligoryzomys*, *Thallomyscus*, and *Melanomys*. *Amer. Mus. Novitates* **580**, 1–19.
- VIDAL RIOJA, L.; DE FRONZA, T. G.; WAINBERG, R.; BRUM-ZORILLA, N.; WALLACE, F.; ZAMBELLI, A. (1988): C-banding pattern and stellite DNA localization on the chromosomes of *Oryzomys flavescens* (Rodentia, Cricetidae). *Caryologia* **41**, 323–328.
- VORONTSOV, N. N.; LYAPUNOVA, E. A. (1978): Variability of sex chromosomes in Mammals I. Geographical variability of morphology of Y-chromosome in voles of genera *Clethrionomys*. (Rodentia-Microtinae) *Genetica* **14**, 1432–1446.

*Authors' addresses:* MARIA BEATRIZ ESPINOSA, Centro de investigaciones en Reproducción, Facultad de Medicina, UBA, Paraguay 2155, piso 10, 1121 Buenos Aires, and OSVALDO A. REIG, to whom reprint requests should be addressed. GIBE, Departamento de Ciencias Biológicas, Facultad de Ciencias Exactas y Naturales, UBA, Pabellón II, 4º piso, Ciudad Universitaria Nuñez, 1428 Buenos Aires, Argentina